

ABSTRACT OF THE DISCLOSURE

This invention relates to internal combustion engines with cylinders arranged parallel to the main shaft and where reciprocating movements of the pistons are converted to rotation by means of a Z-crank mechanism and motion converter, or conversely to systems such as pumps and compressors wherein rotation of the Z-crank and motion converter produces reciprocating motions of the pistons. The motion converter is prevented from rotation by a reaction control shaft or by a gear train. Connecting rods are prevented from rotating about their long axes. Double-ended configurations can be either opposed cylinder or opposed piston, and may include multiple pairs of pistons with each pair in a common cylinder. The Z-crank may be moved axially for the purpose of varying the compression ratio. Variation of the compression ratio is controlled by an engine control unit and is adjusted to optimize engine performance under varying loads and other conditions.